

ROKE



Understanding Complex Behaviour and Events

G Cloud 15
Service Definition

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Understanding Complex Behaviour and Events – Service Definition

Benefit from technologies that understand human behaviour and human-machine interactions.

Roke designs, delivers, and supports components and solutions that enable operators to identify, understand, and respond to complex behaviour and events.

We combine sensor and data expertise with expert understanding of Artificial Intelligence (AI), analytics, cloud technologies, Machine Learning (ML), Deep Learning, Human Science and Agile software delivery.

We perform research, design and delivery of solutions which identify and recognise patterns and anomalies from multiple sources and forms of data, whether in real-time or batch. Our cloud platforms ensure that this can be distributed rapidly to decision-makers.

We also provide User Interface (UI), User Experience (UX), and business analysis to align the technical with the operational and user needs. This ensures that clients are presented with an up-to-date, concise, and prioritised view of information and events to support timely and effective decision-making.

establishing social groupings through gaze analysis, pattern of life categorisation, and anomalous behaviour detection.

For example, Roke's MissionCam draws from the latest advances in vision processing to precisely and accurately identify and track individuals throughout an environment. MissionCam was built in close collaboration with the Field Army, enabling the Land Warfare Centre to identify social networks and connections. It also reveals individual activities undertaken throughout an army mission, supporting process refinement and efficiency.

Roke's Video Motion Anomaly Detection (VMAD) capability performs unsupervised video understanding and anomaly detection. After a 30-minute training period, VMAD can identify unusual motion in a busy, movement-rich scene. This is well-suited to identifying threats, including left baggage, anomalous door use, and the scaling of barriers. VMAD has been successfully deployed in a real airport environment and ported to mobile devices, providing low-cost anomaly detection.

Service Offering

- Human Behaviour Analysis
- Support to Decision-Making
- Advanced Data Visualisation
- Simulated Test Environments

Support to Decision Making

Roke develops technology to support human decision-making in complex, time-pressured, and unpredictable environments. We consider operational and end-user needs in our solutions to ensure that the right information is presented in the correct format according to operational priorities.

Detailed Service Definition

Human Behaviour Analytics

Roke provides solutions for analysis and understanding of human behaviour based on online digital information and sensor data (such as video feeds). Approaches include person identification/tracking technologies,

Roke's STARTLE is an AI architecture for machine situational awareness, which enables autonomous threat detection, assessment and sensor cueing in a human/machine interactive environment. Under Dstl's *STARTLE for Maritime project*, STARTLE AI reduces the workload of users in complex environments by highlighting

maritime threats and providing evidence to decision-makers.

Roke's FAIR (False Alarm and Irrelevant Information Removal) technology leverages Subject Matter Expert (SME) knowledge to evolve a machine-learned model. It learns through routine interactions with data (such as video), easing the process. Users interactively correct false alarms produced by the model and, in doing so, dynamically improve its accuracy. We have demonstrated that FAIR can reduce false alarms, utilising non-specific Deep Learning algorithms, Convolutional Neural Networks (CNNs), and semi-supervised online learning. This online learning method minimises false-positives and hence decreases the burden on the operator.

Advanced Data Visualisation

Roke possesses extensive experience in data visualisation methods, often building on cloud platforms to minimise latency. We use state-of-the-art technologies to enable users to dynamically explore complex data structures. For example, we have built accessible 3D visualisations to allow the interactive exploration of communications networks.

Simulated Test Environments

Through simulation of large-scale human activity, analysts can test solutions and analyse scenarios in a controlled manner. Roke provides test environments for a variety of clients to represent patterns of life and human-generated data. These may be standalone or take advantage of the latest cloud features.

For example, Roke's Deception platform uses autonomous agent technology to create "digital litter" representative of an active and in-use computer network.

We also possess experience in anonymising data and generating large quantities of representative synthetic data. This supports occasions where real data is unavailable or its

usage conflicts with policies. Roke has provided a test data service to Government development teams, delivering representative synthetic test data on human behaviour.

Key Services

Human Behaviour Analytics

- Solutions to understand behaviour based on human online data
- Solutions to understand behaviour based on sensor (e.g. camera) feeds
- Pattern of Life (PoL) understanding and categorisation
- Anomaly detection

Support to Decision Making

- AI for anomaly/threat detection
- Explainable AI
- Advanced approaches for effective human-machine teaming

Advanced Data Visualisation

- Interactive data visualisations
- Intelligent cloud-aided dashboards for decision-making

Simulated Test Environments

- Environments to simulate and generate human digital data
- Synthetic data generation



Pioneering Technology for Global Security & Future Warfare

At Roke, we stand at the forefront of defence and security, delivering cutting-edge intelligence and engineering solutions that protect nations, troops, borders, critical national infrastructure and businesses. We bring the credibility of a long-standing defence and security leader, the precision of a specialist, and the agility to solve complex, high-stakes challenges with purpose and impact.

Roke is at the forefront of shaping the future of digital defence, intelligence, and national security.

We are Roke. We are Changing Worlds.

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